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PAPERS READ AT THE SUMMER MEETING of the OHIO STATE HORTICULTURAL SOCIETY

Held at Gypsum, Ohio, August 12, 1908, in the Orchards of Mr. William Miller.

The summer meeting of the Ohio State Horticultural Society held in the orchards of Mr. H. W. Schmitkons, North Amherst, O., in 1907, was so successful in points of attendance and interest that it was voted at the following annual meeting, January, 1908, to continue the plan of summer, sectional meetings as a feature of future service to horticulture by the State Society. In accordance with these resolutions it was later arranged to hold the next summer meeting at the home and orchards of Mr. William Miller, Gypsum, Ottawa county, one of the important peach-growing centers of northern Ohio.

The 1908 meeting at Gypsum proved quite as successful as that of 1907 in Lorain county. Fully 200 horticulturists were present. The greater number of these were from the lake tier of counties, although other more southern fruit sections were represented by one or more fruit growers.

The program provided for the occasion embodied subjects in which there is general interest, dealing with orchard improvement and insect and fungus control. Following is the list of subjects and the speakers:

Orchard Renewal	S. R. Gill
Spraying for Apple Scab in 1908 Proposed Spray Mixtures for Orchard Use	Prof. A. D. Selby
Control of Pear Blight in Northern Ohio	R. A. Hunt William Miller
Experimental Notes of the Season	Prof. F. A. Gossard

The various addresses and papers are given in full on succeeding pages of this report.

An important feature of the Gypsum meeting was the large exhibit of spraying machinery, by different manufacturers. Spraying demonstrations by the different machines were observed with great interest by the fruit men. All power and hand machines were shown in full operation. The following firms were represented:

The E. C. Brown Co., Rochester, N. Y. Traction vineyard and orchard sprayer.

The Hardie Mfg. Co., Hudson, Mich. Gasoline power sprayer; also a barrel spray pump.

The Deming Co., Salem, Ohio. Gasoline power sprayer.

The Dayton Supply Co., Dayton, Ohio. Special vineyard spraying machine, and cart, hand and knapsack sprayers.

The Niagara Sprayer Co., Middleport, N. Y. Spraying chemicals.

The most regrettable feature of the summer, orchard meetings is the inability of the Society to employ a stenographer for the purpose of recording the various discussions in which many interesting and instructive points are brought out. These are of necessity omitted from the report.

THE RENEWAL OF AN APPLE ORCHARD.

By S. R. Gill, Port Clinton, Ohio.

The orchard in question was planted by my own hands, in rich loam soil, about in the year 1871, and the apology I have to offer for its escape from the bounds of good husbandry towards the clouds, is the fact that the proprietor was absent for twenty-five years after the planting. Under a varied tenantry it received just enough trimming to stimulate growth. When we returned to the farm in 1900, the following spring we began the heroic work. Some of the lateral limbs we could not reach with a twenty foot ladder.

There were two reasons for lessening the height of these trees. First, the necessity of covering every branch and twig the whole way around with spray to control San Jose scale, and to do effective work against the codling moth. To be able, from a tower, with good pressure, to force the poisoned bordeaux into the calyx cup of the newly formed apple. It was impossible to accomplish effectually either of these ends, so vitally important to successful orcharding, with trees as tall as were ours when we began the renewal work. More labor and material were required to spray such a top than is necessary. Second, the labor and cost of picking the fruit was greatly increased by the extra height, and many of the finest specimens we could not pick with ordinary effort.

Among the lesser reasons are, 1st, to lessen the number of windfalls by having the lower top; 2nd, a better size and quality of apples, because of less bearing surface; 3rd, and not least, the good looks of a renewed orchard.

Why we do it, is one thing. *To do* it, is another. A clear conviction that it *must* be done, has to be the mental condition, good bone and muscle the physical, and some knowledge of tree growth so as to cause the least damage and reach the best results by the shortest route.

Many main limbs in this orchard reached above the line, down to which we proposed to finally bring the upper surface. Many main limbs were four to six inches in diameter, at the place of cutting. In no case could all be accomplished in one season.

On ascending the tree the operator must scan every main limb and determine where to cut to win. It may not be exactly the point he would like to apply the saw, to strike his ideal plane for final top, but it must be between upper branches and lower laterals. We must not leave a bare stock. There must be laterals to take ascending sap, to make the shock to tree as light as possible, and to prevent sun-scalding upon limbs reaching to the north and northeast. In a few cases a limb stretching from near the crown of the tree to the top we would remove almost entirely. We say *almost* because to cut too closely is liable to originate decay in the body of the tree.

The whole ten acres, including what my father had planted, was too much for one season. We finished this heavy cutting to the other side of the orchard the following season, 1901. In 1902 we returned to the first work and found that nature had been busy. There were disappointments, happy and otherwise. Generally there were plenty of young growths circling just below where the saw had been applied, and some development still farther below. This lower growth afforded us the opportunity to cut again, being ready to perform its part in the emergency. In case the first cutting was low enough, we had but to lessen the number of whips and cut off two-thirds of what remained. When finally all the main limbs were reduced to as near our ideal plane as practicable, we had but to make annual or biennial visits with shears and saw in order to thin and cut back new growth.

Neglect for a few years, after the first year or two of above work, would make the last estate of that orchardist worse than the first. However, the new conditions of these trees having been reached, they do not require more than ordinary trimming. Without doubt they would have been loaded with more barrels of apples

if we had not undertaken the renewal process; but they are again ready to bear their full share of the world's supply, and meanwhile the boys and I, while taking lower views of the apple trees, have taken higher views of life.

We do not commend that you let your trees, just planted, sow their wild oats before you take them in hand to curb. It is better that they be led in the way they should go; then when they are old they will not depart from it.

Our cattle are permitted to pasture this orchard, or part of it, each year until June and they have attended to trimming the under part, so that between the upper and the nether millstones our trees have limits below and above.

SPRAYING FOR APPLE SCAB IN 1908.

By A. D. Selby, Ohio Agricultural Experiment Station.

The season of 1908 has not been without its lessons in apple spraying. I am limiting my part of the subject strictly to spraying for fungous diseases. Most of you will recall the conditions for much of the state, and especially the southern portion of the state, at the time apples were coming into bloom. About Wooster and farther south, in general, the weather was unfavorable, there was prolonged cloudiness with cold weather, much rain, and at times snow. While in this immediate district the apple blossoms did not open, perhaps, until fine weather set in. Wherever cloudy, unfavorable conditions prevailed the orchardist was confronted by a double difficulty, viz:, conditions unfavorable to effective pollination of the apple blossoms and conditions very favorable to the development of the apple scab fungus. I recall that during the weather period just referred to, Prof. Green and myself were speaking of the situation and predicted an increase in trouble from apple scab.

Another condition has also arisen along with the matter of moisture and temperature, viz., the tendency to omit certain sprayings with fungicides upon orchards where lime-sulfur preparations have been applied for scale. It has, perhaps even been assumed that if these applications are delayed and are made even after growth begins, no further spraying for scab need be applied until after the blossoms drop. Let us note how these have resulted in 1908. On May 23, I received, from a representative of the society in Fairfield county, specimens of fruit and foliage of Rome Beauty apple with the statement that nearly all of the fruit had dropped from his Rome Beauty trees and from the Golden Pippin. The trees had been well sprayed following the dropping of the blossoms and the specimens were covered with the spray; removing

the spray from the small apples and their stems, as well as from the foliage, there showed great abundance of the apple scab fungus. It was noticeable, also, that some of the fruit which had not dropped showed evidences of the scab fungus on it and, in cases, was ready to drop on being touched. At Carpenter, Meigs county, Ohio, upon the southeastern test farm where, through misunderstanding, no spray was applied until after the blossoms dropped, only a very scattered setting of fruit was obtained upon trees of Rome Beauty; and I may state, in this connection, that in the Fairfield county orchard referred to, the fruit saved was but a small percentage of the crop. The difference in these two orchards was that at Carpenter no spraying was done except for scale, while in Fairfield county the owner sprayed with Bordeaux mixture at the swelling and opening of the buds on the trees. In both instances the crop was lost and the few apples remaining were very scabby. On the other hand, as Prof. Gossard will point out, a satisfactory crop of fruit was saved by one application of Bordeaux mixture following blooming, upon the orchards of Mr. Stokes, Erlin, Sandusky county, Ohio, upon trees of the Baldwin and Ben Davis varieties. This was following a lime-sulfur treatment made rather late. Upon the Winesap trees growing with the Baldwin these treatments were not enough to save the fruit crop; although the trees were described as being full of bloom, but a small number of scabby apples were upon the trees July 31 at the time of my visit. By searching we found a limited number of apples on these trees that had no spots. The important point which I would make, however, is not that the apples were almost all scabby, since scabby apples are not hard to find—everywhere there are many this year—but that *these treatments did not save the crop of apples.*

SPRAYING WITH FUNGICIDES JUST BEFORE BLOOMING A NECESSITY.

I feel that apple growers must clearly distinguish, in spraying, between varieties of apples susceptible to scab and those which are not susceptible to scab and, as Prof. Green pointed out many years ago, growers must not forget that the apple scab fungus when prevalent upon susceptible varieties, will strip the trees of fruit unless adequate spray treatment is made. It seems clear to me, also, that in the adaptation of apple spraying to follow treatment of the trees with lime-sulfur for scale, too much reliance may easily be placed upon the fungicidal effects of the lime-sulfur treatment. I am convinced that the facts again justify the conclusion that an application of Bordeaux mixture, or its equivalent, just before bloom, upon the new growth and newly formed blossom buds, is

essential to saving the fruit crop from scab. It is also essential to complete prevention of scab spotting where susceptible varieties are grown, certainly for the grower who has Rome Beauty and Winesap and quite probably for all orchardists. The spraying just previous to bloom is a very important application, since the leaves are young and little or no injury results from a strong spray at this time. I believe there is no very satisfactory substitute for the Standard 4-4-50 Bordeaux mixture at that time.

I would not have you misunderstand me when I insist upon the spray to be applied just before the blossoms open; this statement does not mean that the spray immediately following bloom may be omitted; indeed both are essential to successful scab prevention, and since insecticides must be applied immediately after bloom, no extra spraying will be required to make this application of fungicide. I repeat, therefore, that the experience of the season seems to show clearly that the necessity still remains for two applications of fungicide to be made respectively just before the opening of the blossoms and just after the blossoms have dropped, for the successful control of apple scab upon susceptible varieties of apples in our climate, even where applications of lime-sulfur have been made.

I shall be pleased further to hear the fullest expression upon this point.

PROPOSED SPRAY MIXTURES FOR ORCHARD USE.

The members of the Horticultural Society will recall that in 1907 I proposed a modified formula of Bordeaux mixture in which the amount of copper sulfate was reduced and iron sulfate or copperas was added in large amount to serve the purpose of a "sticker." Some experimenting was done in potato and grape spraying with different strengths of this mixture in the summer of 1907 and promising results obtained. It seemed wise; therefore, to publish the formula in the poster spray calendar gotten out by the Secretary of the Horticultural Society last spring. It is No. 7 of the fungicides on that calendar and is as follows:

BORDEAUX AND IRON STICKER.

Copper sulfate (*blue vitriol*)	2 pounds.
Iron sulfate (*copperas*)	4 pounds.
Quicklime	6 pounds.
(Of dry air slaked lime or hydrate of lime ¼ more.)	
Water to make	50 gallons.

Proposed as substitute for Bordeaux I upon most fruits and certain vegetables including especially apples, grapes and potatoes. The iron sulfate is precipitated by the lime as hydroxid and serves as a dilution sticker. The spray is rusty colored by reason of this iron compound.

The caution is added with respect to leaving solution of iron sulfate standing. Iron sulfate is added in this formula not at all with the view that it will serve as a fungicide, but solely to serve the purpose of a sticker. The amount of copper sulfate employed is reduced one-half upon the belief that half of the expensive constituent distributed through the larger amount of sticker material will be equally effective under most conditions. The results of 1907 with the Bordeaux and Iron sticker spray up to this time seem to be more than realized again for 1908. I believe that it is a very promising spray for apple trees after the bloom drops, also for other fruit trees and for potatoes. It does not injure apple foliage.

Mr. W. M. Scott in Circular No. 6 of the Bureau of Plant Industry has proposed a formula for a self-boiled lime-sulfur mixture which he has used as a fungicide in peach spraying in Missouri The formula proposed is as follows:

SELF-BOILED LIME-SULFUR MIXTURE.

Sulfur,	10 pounds.
Stone lime,	15 pounds.
Water to make	50 gallons.

Put lime in barrel, pour over one bucket of hot water, add sulfur, put in a second bucket of hot water and keep stirring, add additional hot water if same tends to become too sticky, since it must not be allowed to burn. This diluted to fifty gallons is ready to use. The Missouri results in 1907 on peach, were very favorable for scab and rot prevention. The possibility of using this spray on peaches in Ohio was suggested to a few peach growers by the writer on April 23, '08. A limited number of trees were sprayed by Mr. C. F. Dixon, Brownhelm. Upon the occasion of my visit there, July 24th, none of the lime-sulphur sprayed peach trees showed apparent injury to foliage, while the trees sprayed with the dilute Bordeax mixture did show shot-hole effects. Subsequently our host for today, Mr. Miller, received information from Dr. Waite, of the Bureau of Plant Industry indicating that injury to foliage had occurred at Marshallville, Ga. Telegrams were exchanged and advice received to the effect that at Marshallville, Ga., the present season, the self-boiled lime-sulfur made with boiling water seriously injured the peach trees and caused dropping of the fruit; made, however with cold water there was no injury. A full letter of explanation received from Mr. T. W. Ayers, doing the work at Marshallville, Ga., indicates that the formula above given scorched the foliage very badly while a formula consisting of—

Sulfur	6 pounds,
Lime	9 pounds,
Water to make	50 gallons.

Made with hot water produced very little injury; further, all of the self-boiled mixtures made with cold water did not produce injury to the foliage. This spray coats the fruit somewhat badly and from this point of view is objectionable for rot applications late in the season.

As earlier intimated, Prof. Green and the writer arranged for a series of experiments upon Rome Beauty apples at Carpenter, comparing this self-boiled lime-sulfur mixture, Standard Bordeaux mixture and Bordeaux and Iron Sticker; unfortunately no application was made just before bloom and the fruit crop was lost. My notes taken on the foliage July 4th show that there was very serious defoliation from two applications of standard Bordeaux mixture, upon some of the trees nearly half the leaves had dropped; with the lime-sulfur the leaves were then beginning to show injury but as near as I could determine the leaves showing injury were those that had been attacked more or less by scab. The trees sprayed with the Bordeaux and Iron Sticker showed very fine foliage conditions, except for some marks by scab. I have not visited the orchard since that time.

In conclusion I wish to repeat a statement I have often made, viz., that progress in fungicides is not impossible. I believe the two fungicides above discussed give considerable promise for the future.

COMBATING PEAR BLIGHT.

By R. A. Hunt, Euclid, Ohio.

This is a subject which I feel that I am poorly equipped to discuss. It requires a Professor from the Station. All I can do is to give my experience and my brother fruit growers can take it for what it is worth.

I set out my first pear trees, standards and dwarfs, thirty-nine years ago. The first setting of standards is all gone. Most of the dwarfs remain and are doing good service. Consequently I have turned my attention to the dwarf as the more profitable for me.

The treatment for the blight that I have followed for the past six years, and how I came to adopt it is this: I had a block Duchess that I took a great deal of pride in—not a tree missing—and I desired to maintain this block unbroken. Then, as though an epidemic had struck them, I found that nearly all were affected with body-blight. My business calling me away from home part of the time, I had to depend upon hired help. Just before leaving on a three weeks' trip I was looking through the orchard and noticed two trees

that were barely alive and had made no growth whatever. As I did not have time to call my man (a German) who worked for me, and show him the trees, I took my pocket knife and cut strips of bark from the ground to the limbs all around one of the trees, leaving strips about one inch wide between the cuts. The tree was about four or five inches in diameter and two feet from the ground to the first branches. I told my man to take out that tree and also the end tree in the next row. Thinking he could make no mistake, I did not mark the second tree.

On my return home I found that the man had failed to fulfil my orders; and thanks to him for his neglect of duty. On looking at the marked tree which he had left, I found that new bark was forming on the cut strips; and today that tree is as healthy as any one in the plot. The other tree which the man had also failed to take out, was dead by the next spring.

Since then I am confident that I have saved a good many trees by cutting away the diseased bark before it entirely surrounds the body or branch, at any time from spring to October. On some of the trees I have removed the entire outer bark, all around the tree, with no ill effect, by leaving some of the cambium or inner bark.

I have tried nearly all kinds of wash, but find no benefit after the blight is started. But I do think there will be something found that will act as a preventive. Two years ago I was using whale-oil soap for the scurfy bark louse on the body of some pear trees, applying with a paint brush that was full of red paint. Some of the trees were well painted. The bark was in a healthy condition and has remained so. I am keeping some painted and will watch results.

In cutting away diseased bark I do not apply any wash, as I have had just as good results without. One of my neigbors reports good results by following the same plan.

Twig blight is easily controlled if taken as soon as it makes its appearance on the tips of the twigs, by cutting off six inches or more below the diseased parts.

COMBATING PEAR BLIGHT.

By William Miller, Gypsum, Ohio.

While not by any means banishing pear blight from my orchard, I believe that we are making progress and hope in the near future we may successfully control it as we do some of the fruit growers' troubles which, a few years ago, seemed beyond control.

My efforts have been along the lines suggested by Prof. Waite, of the Department of Agriculture, and consists in carefully paring away all portions of diseased branches. The best time to do this is in the fall while the dead, brown leaves adhering to the tree will

help in locating blighted, branches which would be difficult to discover after the leaves fall. The pretty reddening of the leaves at this time, which we have been wont to ascribe to the work of frost, is a strong sympton of the presence of blight. This cutting away should be thoroughly done, that there be no sources of infection left. Tools used in this work, and the wounds made, should be disinfected with a weak solution of carbolic acid or corrosive sublimate, before passing to another tree. For this purpose the workman is provided with a bucket of the solution and a paint brush.

It is difficult to find all the spots of live blight, but if every spot found is pared away and every diseased branch removed and burned, we are ready for the most important and essential treatment so far suggested in blight control.

It has long been known that this disease is carried from tree to tree by bees and other insects during the blossoming period. If at this time there be no source of contagion there will be no spread of the disease. This year just before the blossoms opened we gave a second lime and sulfur spraying, having as great an excess of lime as the spray nozzles would distribute, plastering in every spot where blight germs might lurk, to be carried on foot of bird or bug or bee. If the blossoming period can be tided over without spreading the disease, there will be little danger later. Like attention should be given to pruning cankered branches and spraying adjacent apple trees.

EXPERIMENTAL NOTES OF THE SEASON.

By H. A. Gossard.

I shall first speak of some work of local interest, since our field of operation is located near this place.

Many peach orchards and cherry trees near Lakeside and Marblehead have been attacked the past two or three years by bark beetles. Two species are concerned in the attack; the common Scolytus bark beetles, and another smaller beetle that has hitherto attracted but little attention. So serious was the situation in the infested section that the Bureau of Entomology of the United States Department of Agriculture, was persuaded to cooperate with the Ohio Station in studying the pest.

Prof. Quaintance, in charge of investigation of insects affecting deciduous fruits, detailed Mr. H. F. Wilson to spend the summer in the infested districts and determine the life history of these pests, and to test remedies for their control. The outlines for studies and tests were prepared conjointly by Prof. Quaintance and myself.

The life history work has been very successful and there are apparent results with the remedies tested. Of course no final conclusions can be formed from the uncompleted work of a single season, but what seems to have been accomplished, coupled with local history of treatments given to infested orchards in preceding years, gives reason to hope that means for the control and prevention of the insects will be found.

A twelve percent emulsion of Carbolineum Avenarius, sprayed on the trunks and larger limbs, kills many of the larvae and beetles in their burrows, and the living beetles seem to leave the sprayed trees. This treatment should be given in the spring before the leaves appear. So far as can be determined from our limited trials of this preparation, no injury is done to the trees by this strength of emulsion. Coating the trees with a thick whitewash, by means of a broom, in the spring of the year, also seems to be very useful.

Cutting the trees back severely and fertilizing well, are also measures of prime importance. Late summer, or early fall treatments with whitewash or Carbolineum emulsion, will be needed to stop the second brood of insects. Applications of hydraulic cement made into a whitewash with milk, seem to have about the same value as ordinary whitewash.

We are conducting our spraying experiments against the Codling worm in the orchard of J. A. Stokes, near Erlin. We are largely duplicating the work we did last year in the Schmitkons' orchard, and are trying to gain additional information regarding some unsettled points. We omitted the Bordeaux mixture from the first spraying after bloom over a large number of orchard blocks. These were heavily sprayed with arsenate of lead alone—three pounds to fifty gallons of water. The trees were quite large, most of them averaging from twenty-five to thirty-five feet in height. The trees are planted thirty-three feet apart each way, and some of the limbs interlock. We found it necessary to use about twenty gallons of spray per tree, on these large trees. Other blocks of the orchard received Bordeaux and others were given the home-boiled lime-sulfur wash, as a fungicide. Tests were also made with the Rex lime-sulfur, and the Niagara lime-sulfur, as similar applications. No lime-sulfur was used for the first spraying, but some of the blocks received it for the second application. We did not use arsenate of lead in the lime-sulfur, fearing that chemical disintegration would take place, and that arsenic would be freed. The weather during the entire spraying period was exceptionally fine.

Previous to vernation, the entire orchard was sprayed with the home-made lime-sulfur wash for San Jose scale; also a few blocks were sprayed before the bloom with Bordeaux mixture. It is possible that results would have been somewhat better if the entire orchard had been sprayed, before blooming, with Bordeaux mixture.

Some varieties, such as the Winesap, set but a small crop of fruit, and this is very scabby. There is a little scab upon the Ben Davis blocks that did not receive Bordeaux in the first application after bloom. However, the Baldwins, Ben Davis and the Starks are much cleaner of scab than most of the fruit grown this year. The foliage is better on the blocks treated with lime-sulfur, than on those that were sprayed with Bordeaux. We find very few worms in the orchard; almost none at all on trees that were heavily sprayed just after blooming. We were a little too late in getting at the Baldwins, and these are showing a larger percentage of worms than the Ben Davis.

Our spraying outfit consisted of a small gasoline engine and a 150 gallon tank, mounted on trucks. The whole outfit was drawn by one horse, and on the whole was a very convenient apparatus for passing among such large trees, closely grown together. For the upper extension rod which was used for spraying the tops of the trees, we used a cluster of six spra-motor nozzles, arranged on a hollow ring. The lower rod carried two Mistry Junior nozzles, one of which is capable of doing the work of about two vermorels. We carried from 100 pounds to 125 pounds pressure, and with the pump working in perfect order, could empty the spray tank in 40 minutes. At the present time we can see very little difference in degree of worminess, between the trees that were heavily sprayed but once, and those that were sprayed a greater number of times. We believe that one spraying, thoroughly made after bloom, will control the codling worm.

We are also conducting work with the Grape-berry worm. Our experiments this season are located at Euclid. We are duplicating the work of previous years. Our results seem to agree perfectly with those hitherto obtained. One spraying is made before bloom, with Bordeaux mixture and arsenate of lead, combined. A second application if given after bloom, and a third about the middle of July, or a little earlier. We find that this late spraying is very important—probably the most important application of all that are recommended. A soap sticker in the spray adds to its effectiveness against the worms, but makes the fruit somewhat

questionable for market, especially in dry seasons where rains do not come to remove any considerable part of the poison before the grapes are picked.

Three or four pounds of iron sulphate added to each fifty gallons of spray, seems in some respects to be an excellent sticker. It increases the adhesiveness of the spray, and at the same time lets go before harvesting time, permitting the spraying materials to be washed off the fruit by the rains. It also seems to have a distinct tonic effect on the vines, increasing the amount of foliage and the vigor of the fruit.

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